Northeast Coastal and Barrier Network
Inventory & Monitoring Program

Northeast Region
National Park Service
U.S. Department of the Interior

Assateague Island NS • Cape Cod NS • Colonial NHP • Fire Island NS • Gateway NRA
George Washington Birthplace NM • Sagamore Hill NHS • Thomas Stone NHS

Climate Change Resource Brief October 2011

Enhanced Monitoring of Natural Resource Condition in Light of Climate Change

The goal of the National Park Service's Climate Change Response Strategy is to enable parks "to adapt to climate change and effectively preserve and restore park resources and opportunities for visitor enjoyment." Preparing for rapid climate change requires knowledge of the current condition of park resources: we must know where we are today in order to understand what has changed in the future.

The NCBN is working to meet these goals by providing sound scientific information and data to Network parks on the effects of climate change on park natural resources, as well as contribute towards a multi-agency collaboration to better understand these effects at a regional scale.

In 2010 and 2011, the NCBN, in collaboration with the NETN and the NCRN, received additional funding to develop a strategy (Stevens et. al., 2010) for enhancing existing monitoring in light of climate change, and to begin implementation of this strategy.

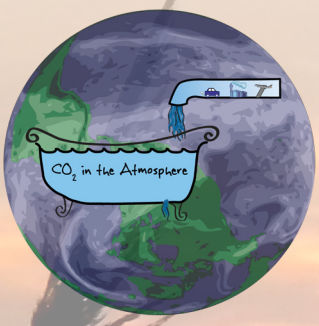
The following were identified as highest priority for enhancing the Network's monitoring plan:

- Expand existing interagency collaborative effort to monitor salt marsh capital along the Atlantic coast in 10 national parks in conjunction with 12 coastal United States Fish and Wildlife Service (USFWS) sites, as well as National Estuarine Research Reserve sites (NOAA, NERR) along the North Atlantic. This effort will include standardized protocols, databases and data collection.
- Expand analysis, synthesis and reporting of datasets produced by other agencies and organizations such as climate, tide, sea level, and remotely-sensed data to park managers and others to enhance our understanding of the effects of climate change.
- Expand the existing interagency effort to monitor breeding marsh birds in North Atlantic parks within Bird Conservation Area 30 (BCR 30) through the Northeast Coordinated Bird Monitoring Partnership.

New website to help park managers plan for rapid changes

We should all be aware of it by now. Global temperatures have risen, and are continuing to rise. Beyond average temperature increases though, it can be hard to get information on how specific regions are likely to change. The North Atlantic coast and the national parks along it are no exception. In an effort by the NCBN to give land managers and the public an idea of how this will affect the North Atlantic, we developed a website with original diagrams and images that synthesizes the most recent scientific research on climate change in the North Atlantic. There is also clear information on the basics of climate change science. Even if you think you understand the consequences of climate change, the site is worth visiting because the reality of our rapidly changing planet can be hard to imagine and accept.

The information that is provided can help park managers to prepare the parks to be as resilient as possible to the effects of rapid climate change. The website describes likely changes that will occur over the next century to National Parks from Colonial National Historic Park in Virginia, north up to Acadia National Park in Maine. Future scenarios of climate change effects are presented in several ways. Different habitats found within the parks can be looked at individually such as salt marshes, rocky intertidal zones, or coastal uplands. Climate factors that will affect the parks can be viewed individually including: temperature increases, sea-level rise and ocean acidification, an increase in weather extremes, phenological shifts and species invasions. **visit the site @ http://ncbn.edc.uri.edu/projects/climate/**



The site (above) can direct the visitor to different habitats within NCBN parks and explain how climate change may affect them in the future (such as the rocky intertidal zone to the right), demonstrate changes to specific parks and their inhabitants, and has great resources for better understanding carbon dioxide and global warming science (such as this diagram to the left that compares Earth to a bathtub, visit & find out why).

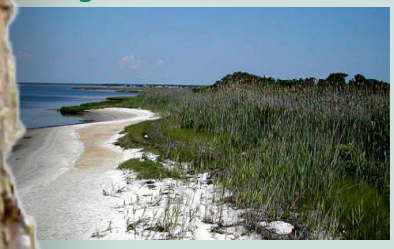
VitalSign Monitoring

A finger on the pulse of our National Parks

Regional Weather and Climate Monitoring Initiated

Since 2010, the NCBN has been collaborating with other North Atlantic coast networks to enhance existing monitoring by adding climate-related metrics. Automated data reporting systems for weather and climate metrics are being developed. Planning will include partnerships with NOAA, USFWS, and other federal and nonfederal agencies and graphics will present change yearly of indicators such as growing season, annual precipitation, storm events and heavy snow days.

NCBN Coastal Shoreline Monitoring Protocol adopted by USFWS refuges



As a result of NCBN coastal shoreline monitoring and topography mapping, parks are able to identify areas where infrastructure and natural resources are threatened by a rapid increase in erosion due to factors such as sea level-rise and increased storm intensity and frequency. The Northeast Region of US Fish and Wildlife Service recently adopted and began to implement the NCBN's shoreline change monitoring protocol at over a dozen coastal refuges in 2011. Prior to implementation, the NCBN and Rutgers University collaborators hosted a two-day training for NPS and FWS natural resource staff at the University of Rhode Island. Over 20 coastal biologists received both classroom and field training in using high-accuracy GPS equipment in conducting shoreline mapping surveys.

New Marsh Bird Monitoring Program!

Birds that nest in tidal marshes are generally secretive and difficult to detect. Population trends for these species indicate they are declining and now are recognized as species of conservation concern. NCBN parks provide important feeding, nesting, and roosting habitat for tidal marsh birds. With predictions of rapid sea level rise, increased frequency of storm surges, and increased marsh inundation, these species have become an important indicator of tidal marsh health.

Marshbirds like this saltmarsh sparrow are accurate indicators of saltmarsh health.

In 2011, the NCBN expanded Vital Signs to include marsh bird monitoring. During the summer of 2011, the Network partnered with the regional "SHARP" project, funded by the USFWS (http://www.tidalmarshbirds.org/) a large effort to investigate marshbird populations throughout the northeast over a 3 year period. As part of the Network's enhanced monitoring funds, the NCBN was able to hire a new employee to develop and lead this volunteer-based program for North Atlantic coastal parks.

Salt Marsh SET Monitoring Expanded

Understanding changes in salt marsh elevation is necessary for interpreting long-term trends in salt marsh viability. The elevation of salt marsh surfaces must increase over time to keep pace with the annual rise in sea level. The use of Surface Elevation Tables (SET's) in the Northeast and National Capital Regions began in 1998 with the installations at Cape Cod National Seashore. Since then, SET's have been installed at many coastal parks and some freshwater tidal sites. Recently with additional climate change monitoring funds, the NCBN and other coastal Networks have been able to expand this program to add sites and SET stations, region-wide. As part of this effort, the NCBN recently hired a wetland biologist trained in SET monitoring to lead the program for 3 NE Region networks. The NCBN continues to collaborate with the SECN, NCRN, NETN, NOAA, USGS and USFWS and has recently began developing a new standardized SET monitoring protocol as a collaborative effort.

Global Loss of Salt Marsh

About 25% of the area originally covered by salt marsh has been lost globally, with current loss rates of about 1 to 2% per year (Bridgham et al., 2006). Salt marsh monitoring is a key component of the NCBN monitoring program. The Network is monitoring the effects of sea level-rise and climate change on salt marsh by measuring changes in marsh vegetation communities, nekton (fish and decapods) diversity and richness, soil salinity, and sediment elevation. Shifts in species composition and spatial distribution of vegetation on the marsh, including the presence of invasive species may indicate changes in salinity levels, tidal flow, and groundwater levels. Nekton serve as indicators of ecosystem change because they are sensitive to environmental changes such as temperature and nutrient levels.

Global Loss of Seagrass

Seagrass is one of the organisms predicted to thrive in a high carbon dioxide world. Seagrass ecosystems, considered high biomass producers, are significant carbon sinks. However, a recent assessment indicates that about one-third of the global seagrass area has been already lost, and that these losses are accelerating, from less than 0.9% per year in the 1970's to more than 7% per year since 2000 (Waycott et al., 2009). Seagrass monitoring at Cape Cod NS, Fire Island NS, and Assategue Island NS provides these parks with information on changing distribution of seagrass resources and site-specific trends in habitat characteristics. This information is valuable for assessing system-wide responses to estuarine nutrient enrichment and on the overall condition of seagrass resources throughout park estuaries.

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